

Ch 6 Similarity

6.1 Ratios, Proportions, and the Geometric Mean

Ratio--compares 2 numbers

$$a:b$$

$$\frac{a}{b}$$

$$(b \neq 0)$$

Example
1860 students
310 athletes

Athlete: student ratio

$$\frac{310}{1860} = \frac{1}{6}$$

Athlete: non-athlete ratio

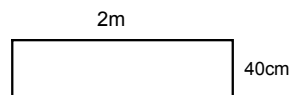
$$\frac{310}{1550} = \frac{1}{5}$$

Must convert to the same unit!

to smaller unit

K H D Base D C M

meter
centimeter
millimeter
2



200cm

L:W
200:40
5:1

Simplify

2 ft : 20 in

$$24:20$$

$$6:5$$

12 ft : 5 yd (3ft = 1yd)

$$12:15$$

$$4:5$$

The ratio of 2 supplementary angles is 4:5.
What are the measures of the angles?

$$4x + 5x = 180$$

$$x = 20$$

$$80^\circ \quad 100^\circ$$

The ratio of the angles in a triangle are 2:3:4.
What are the measures of the angles?

$$2x + 3x + 4x = 180$$

$$x = 20$$

$$40^\circ \quad 60^\circ \quad 80^\circ$$

Proportion—equation stating 2 ratios =

$$\frac{a}{b} = \frac{c}{d}$$

“a is to b as c is to d”

$a+d \rightarrow$ extremes

$b+c \rightarrow$ means

Cross Products Property

$$\frac{a}{b} = \frac{c}{d}$$

Product of Means = Product of the extremes

$$bc = ad$$

examples:

ex 1

$$\frac{6}{18.2} = \frac{9}{y}$$

$$\frac{6y}{60} = \frac{9(18.2)}{6}$$

$$y = 27.3$$

ex 2

$$\frac{4x-5}{3} = \frac{-26}{6} = \frac{-13}{3}$$

$$x = -2$$

Geometric Mean

$$\frac{a}{x} = \frac{x}{b}$$

$$x^2 = ab$$

$$x = \sqrt{ab}$$

 $x \rightarrow$ geometric mean

Find the geometric mean between 24 and 48.

$$\frac{24}{x} = \frac{x}{48}$$

$$\sqrt{x^2} = \sqrt{24 \cdot 48}$$

$$x = 24\sqrt{2}$$

(Handwritten notes: 24 · 48, 24 · 2)

Find the geometric mean between 12 and 27.

$$\frac{12}{x} = \frac{x}{27}$$

$$\sqrt{x^2} = \sqrt{12 \cdot 27}$$

$$x = 18$$

(Handwritten notes: 12 · 27, 4 · 3 · 3 · 9, 2 · 3 · 3)

Find the geometric mean between 16 and 18.

$$12\sqrt{2}$$

6.2 Use properties to solve Geometry Problems

Additional properties of proportions

$$\frac{a}{b} = \frac{c}{d} \quad \frac{c}{a} = \frac{d}{b}$$

$$\frac{a}{c} = \frac{b}{d} \quad \frac{b}{a} = \frac{d}{c}$$

$$\frac{a+b}{b} = \frac{c+d}{d}$$

Scale--ratio describing dimensions

ex:

A room has a length of 40ft and a width of 9 ft.

A scale model has a length of 16 units.

What is the width of the scale model?

$$\frac{l}{w} \quad \frac{40}{9} = \frac{16}{x} \quad \frac{l}{w} \quad \frac{40}{16} = \frac{9}{x}$$

$$40x = 9 \cdot 16$$

$$w = 3.6 \text{ units}$$

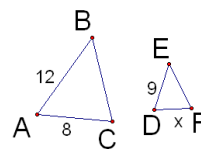
ex: solve for x.

$$\frac{AB}{DE} = \frac{AC}{DF}$$

$$\frac{12}{9} = \frac{8}{x}$$

$$\frac{14}{28} = \frac{3}{x}$$

$$x = 6$$



While baking muffins, Kathy noticed that the recipe for 48 muffins required 900g of flour.

She then discovered that she only has 675g of flour. How many muffins can she bake?

$$\frac{48}{900} = \frac{x}{675}$$

$$x = 36 \text{ muffins}$$

A map scale states that every 2 in is 76mi. If the distance, on the map, between two cities is 5in, what is the actual distance between the two cities?

$$\frac{2}{76} = \frac{5}{x} \quad x = 190 \text{ mi}$$

A flagpole casts a shadow 22ft long. If a man 6ft tall casts a shadow of 4ft, how tall is the flagpole.

$$\frac{6}{x} = \frac{4}{22} \quad x = 33 \text{ ft}$$

HW

p360-363 #s 3-5, 7-9, 14, 15, 18-20, 29, 30,
34, 35, 60, 65

p367 #s 7-10